

THE SEVENTH
AND EIGHTH
WORKSHOPS IN
WELDED ELECTRONIC
PACKAGING

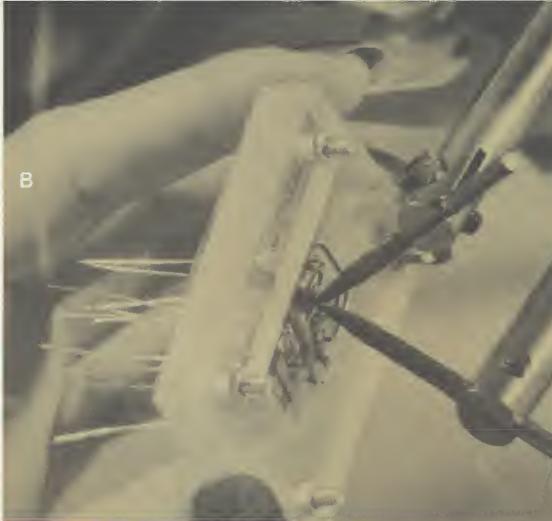




THE SEVENTH
AND EIGHTH
WORKSHOPS IN
WELDED ELECTRONIC
PACKAGING

Sponsored by

WELDMATIC DIVISION
UNITEK



General Information

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*A. Thermocouple welding
with portable handpiece*

*B. Welded Module
application*

D. Cathode tube assembly

C. Structural bonding

E. Structural bonding

DATES

WORKSHOP 7

January 23-27, 1967
8:30 A.M. to 5:30 P.M.

Monday through Friday
(to 10 P.M. Monday & Wednesday)

WORKSHOP 8

February 6-10, 1967
8:30 A.M. to 5:30 P.M.

Monday through Friday
(to 10 P.M. Monday & Wednesday)

PLACE

UNITEK/WELDMATIC DIVISION
950 Royal Oaks Drive
Monrovia, California 91016

PURPOSE

- To provide a comprehensive presentation and survey of welded electronic packaging.
- To present the state of progress and future expectations for advanced packaging techniques currently under development.
- To help bridge the gap between the development of advanced packaging techniques and their various potentially important applications.
- To provide the basis for evaluation of the relative merits of various techniques and their applications to specific packaging requirements.

FOR WHOM INTENDED

For those engaged in the application or utilization of electronic packaging techniques and who need a thorough knowledge of welded circuitry and related disciplines. This would include management, engineering, manufacturing and quality control personnel in supervision capacities concerned with package design and fabrication.



Description

The Seventh and Eighth Workshops in Welded Electronic Packaging are based on the premise that higher product reliability in packaging is positively related to the accurate requirement understanding of those who design, perform and evaluate the work. Considerable emphasis is given to the means of assuring high reliability in process and product.

Sponsored by Unitek/Weldmatic Division, these workshops represent concentrated courses in welded circuitry and associated technical disciplines, including semiconductor packaging methods. Recent advances in flatpack welding, reflow soldering, die bonding, ultrasonic wire bonding, thermocompression bonding and percussive arc welding are covered. Ample time is provided for reviewing specific problems with each of the highly qualified instructional staff. A total of 45 full hours is devoted to lecture, discussion and laboratory training. Students will construct an actual welded module to gain knowledge of procedures and design considerations in producing welded circuitry. In addition, participants will actually operate semiconductor production equipment such as the die bonder, ultrasonic wire bonder, thermocompression wire bonders, probe equipment and other related equipment.

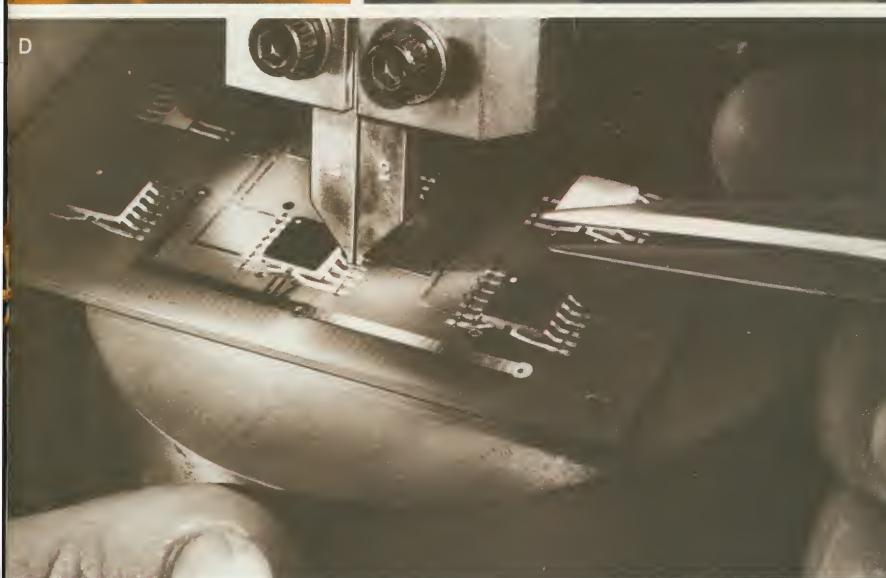
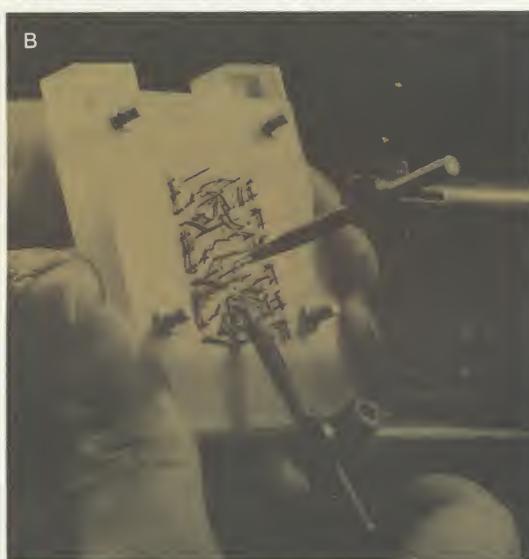
The instructors are selected from diverse industries in order to provide a range of ideas and techniques for discussion. They are selected on the basis of depth of experience, job responsibility and high professional reputation. Each is a working practitioner in his particular discussion area. An unusual opportunity is offered to engage, both formally and informally, in a challenging interchange of knowledge and experience with members of the instructional staff and with other participants.

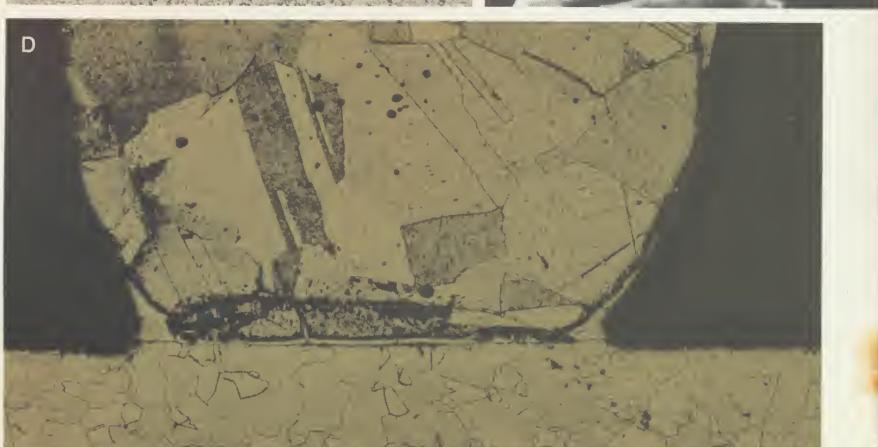
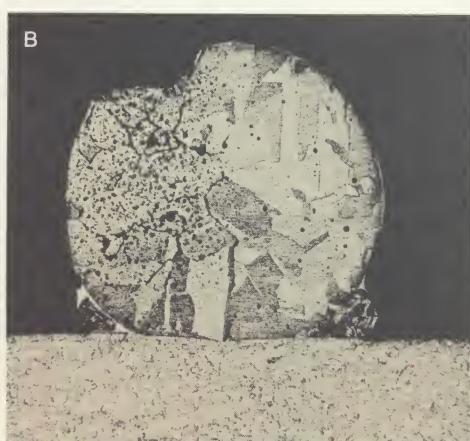
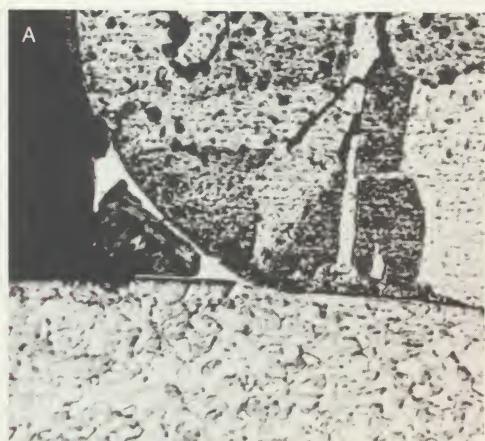
A. 3-D Welded Module production

B. 3-D Welded Module production

C. 3-D Welded Module production

D. Flat pack welding to printed circuit boards





Program

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A. Detail of photo B
Photo-micrograph of
B. Kovar wire to Nickel
ribbon weld

C. Photo-micrograph of
Nickel wire to Nickel
ribbon weld
D. Photo-micrograph of
Kovar wire to Nickel
ribbon weld

| MONDAY January 23 & February 6 | | |
|--|---|---------------------------------------|
| MORNING | <i>Registration</i> Keynote Address Fundamentals of Resistance Welding | Lt. Col. Greenfield John R. Sosoka |
| AFTERNOON | Metallurgical aspects, electrical characteristics and weldability of component lead interconnect materials. Developing the optimized weld schedule. | James R. Gates |
| EVENING | <i>Laboratory.</i> Equipment familiariza- tion and the development of weld schedules. Weld verification. | Staff |
| TUESDAY January 24 & February 7 | | |
| MORNING | Design approach to high-density packaging including electronic circuit analysis, component grouping, module arrangement, interconnections and package configuration. | Sy Golub |
| AFTERNOON | <i>Laboratory.</i> Fabrication of the welded module. | Staff |
| WEDNESDAY January 25 & February 8 | | |
| MORNING | Production techniques, process control and operator training. | James V. Nocero |
| AFTERNOON | Providing for thermal and structural stresses in encap- sulated modules. Methods of encapsulation and material properties. (continued on next page) | H. F. Sawyer |

Program

WEDNESDAY January 25 & February 8 (continued)

EVENING *Laboratory. Fabrication of the welded module continued.* Staff

THURSDAY January 26 & February 9

MORNING *Elements of a product assurance program — inspection, testing and standards. Reliability evaluation and control.* E. L. Aiton

Parallel-gap flatpack bonding. Design considerations, weld scheduling and solder reflow techniques. Quality control and inspection.

Chester M. Koski

AFTERNOON *Field trip.
TRW SYSTEMS, Redondo Beach
EPI/VOSTRON, Anaheim*

FRIDAY January 27 & February 10

MORNING *Semiconductor scribe and break techniques, die bonding, ultrasonic and thermo-compression wire bonding.* Gerald G. Mullen

AFTERNOON *Round table discussion.* Staff

A. *Detail of die bonding equipment*

B. *Thermocompression wire bonding*

C. *Semiconductor probing*

D. *Flat Pack attachment of wire to thin films*

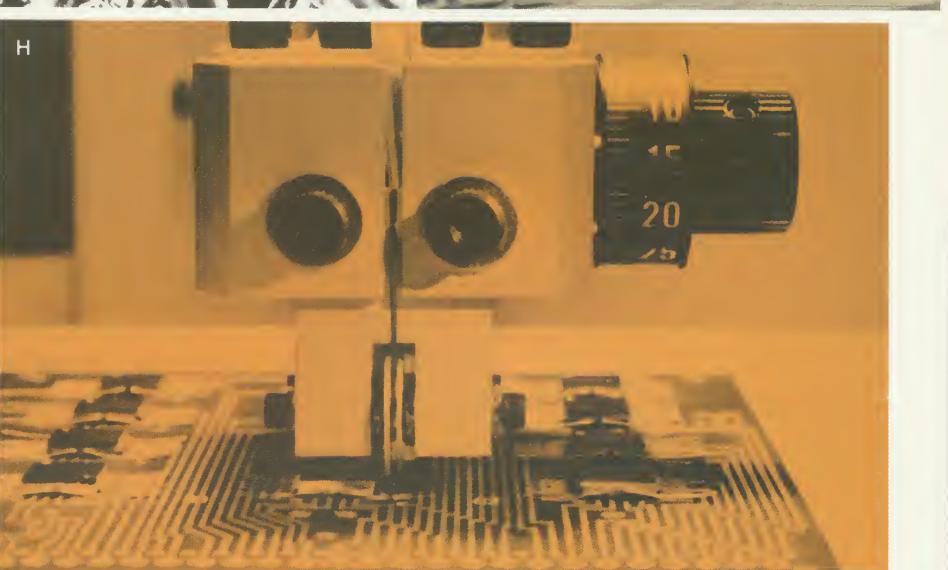
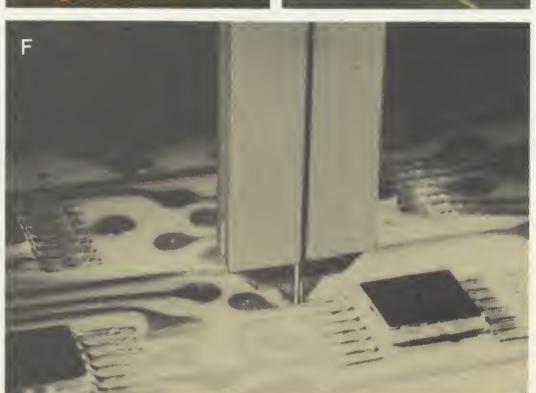
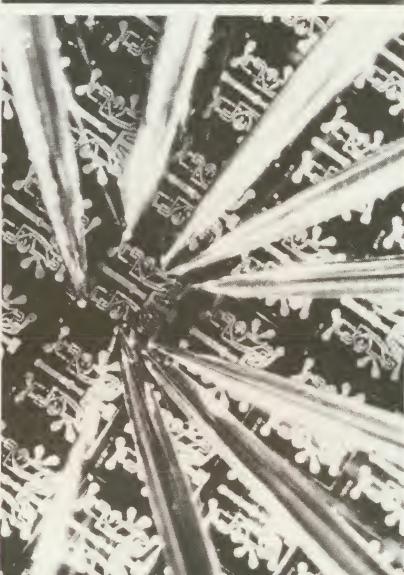
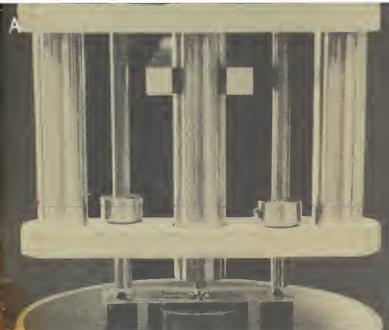
E. *Parallel gap welding of potentiometer terminations*

F. *Reflow soldering of flat packs to printed circuit board*

G. *Ultrasonic wire bonding*

H. *Automated flat pack welding to printed circuit boards*

I. *Flat pack welding to printed circuit boards*





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B



D

Guest Lecturers

A. E. L. Aiton

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B. James R. Gates

E. L. AITON is Manager of Product Assurance at Electro-Optical Systems, Inc., Pasadena, California. He is responsible for quality control and reliability and has been assigned to Ranger and Mariner Power Systems and USAF Ion Engine Flight Test. Previously, he was with United Aerospace where he established procedures and reliability training programs on Atlas and Titan Guidance Systems. His reliability experience also includes the "OGO" Space vehicle program while at STL and Pershing program at Martin-Marietta Corp. He received his BS and MS degrees in mathematics and statistics from the University of Florida.

C. Sy Golub

SY GOLUB is President of Electronics Packaging Associates Inc., Encino, Calif. His nineteen years of design engineering experience include fourteen with U.S. Navy and U.S. Air Force classified programs. He has been a consultant to the U.S. Air Force and a participant in packaging design reviews for Gemini spacecraft. As a senior scientist for Electro-Optical Systems, he was involved with packaging of systems on Mariner, Ranger and Apollo spacecraft. He also managed design and packaging of electronic systems in rockets and spacecraft with United Electro Dynamics, Inc. He received his BS from Pratt Institute and is a graduate of RCA Institute.

D. Lt. Col. William D. Greenfield

JAMES R. GATES is Vice President of Engineering and Operations Manager of EPI/VOSTRON, Anaheim, California. His experience in metallurgical and mechanical aspects of packaging electronic circuitry includes development of new joining techniques in hybrid and microminiature circuits. Formerly, with WEMS, Hawthorne, California, as Director of Metallurgical Engineering and Prototype Department, he has also been a consultant in specifications and reliability standards and a lecturer at UCLA. He received his BS in Metallurgical Engineering and has done extensive graduate work at Ohio State University.

LT. COL. WILLIAM D. GREENFIELD is Chief of Vehicle Engineering Division, Agena Space Vehicle Directorate with the U.S. Air Force Space Systems Division, Los Angeles, California. He is responsible for all engineering activities associated with the Agena Space Vehicle. His twenty-three years of engineering service with the U.S. Air Force includes electronic packaging, production and quality assurance experience in communications and air traffic control facilities, radio and radar equipment, and space vehicle electronics. He received his BSEE and MS from Air Force Institute of Technology and Stanford University.

Guest Lecturers

GERALD G. MULLEN is Manager of Tooling and Industrial Engineering of Stewart-Warner Microcircuits, Inc., Sunnyvale, California. He is responsible for design and supervision of current projects including multicolor inking and probing equipment, Horizontal Epitaxial Reactor, Centrifugal Rotors, Evaporation Fixtures and Final seal equipment. His eighteen years in electronics includes design and engineering responsibilities with Microtech Manufacturing Company, Worcester, Massachusetts, and Fairchild Semiconductor, Mountain View, California. He attended Washington State University and also the University of California at Berkeley.

JAMES V. NOCERO is a manufacturing engineer responsible for welded module production, operator training, and equipment at TRW Systems, in Redondo Beach, California. His fourteen years in electronics includes experience with Motorola and Bell Aircraft. He is a certified NASA welding instructor and has studied at the University of Buffalo, Arizona State University and Loyola University.

CHESTER M. KOSKI is a design engineer assigned to the Oceanic Products Division of Aerojet General Corporation, Azusa, California. He has sixteen years experience in electronic packaging

design of 3D modules, printed circuit boards, power supplies, computers, and systems for use in naval weapons, aircraft controls/devices, and missiles. He is a graduate of Lansing Technical School and has completed advanced studies at the Southeastern Signal School, Augusta, Georgia and UHF Radio School, Karlsruhe, Germany.

H. F. SAWYER is Senior Design Specialist responsible for development of 3-D Packaging Design Standards within the Advance Packaging Techniques Group at General Dynamics/Pomona. He has a total of twenty-one years experience in electronics which include U.S. Army Signal Corps, Westinghouse, and the Firestone Guided Missile Division. He received his education at the University of California at Berkeley, BSEE June 1947.

JOHN R. SOSOKA is a member of the Manufacturing Technical Staff of TRW Systems, Redondo Beach, where he is responsible for technical direction and assistance for all welding processes used in the fabrication of electronic hardware. His fourteen years experience in material behavior, welding, and electro-mechanical design was acquired at UCLA Institute of Geophysics, Shell Development Co., Statham Instruments, Aerojet General, and Unitek Corp. He received his BS from UCLA in 1952.

A. Gerald G. Mullen

B. James V. Nocero

C. Chester M. Koski

D. H. F. Sawyer

E. John R. Sosoka



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Admission

REQUIREMENTS FOR PARTICIPATION

There are no formal educational requirements for participation in the course. A desire to contribute to and benefit from a full interchange of knowledge, ideas and experience is considered to be more important than a formal training background.

REGISTRATION

The fee for each Workshop is \$495.00. This includes the cost of all required texts and materials, and all noon meals.

ENROLLMENT

In order that each individual may have maximum opportunity for class participation, enrollment in the workshops is strictly limited. Priority of space will be determined by order of receipt of registration fee. Organizations may exercise the privilege of enrolling unnamed individuals and supply the names and application at a later date. A check or purchase order for the amount of the fee must accompany each enrollment application. For additional applications, use a separate sheet, including all required information.

LIVING ACCOMMODATIONS

A limited number of rooms have been reserved at the Flamingo Ramada Hotel, 130 W. Huntington Drive, Arcadia, California. Upon receipt of registration for the Workshop, registrants will be sent a reservation card which should be completed and returned to the Flamingo. Persons who write direct for reservations should state that they are attending the Unitek Workshop to insure reservations and rates. Transportation to and from the hotel will be provided.

INFORMATION

Additional information may be obtained by telephoning 213 359-8361; by TWX 910 370-7455 or by writing E. F. Koshinz, Unitek/Weldmatic Division, 950 Royal Oaks Drive, Monrovia, California 91016.

Application

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SEVENTH & EIGHTH WORKSHOPS IN WELDED ELECTRONIC PACKAGING

UNITEK/WELDMATIC DIVISION 950 Royal Oaks Drive, Monrovia, California 91016

NAME _____
(Please print or type)

TITLE _____

COMPANY _____

COMPANY ADDRESS _____ TELEPHONE NUMBER _____

CITY _____ STATE _____ ZIP CODE _____

HOME ADDRESS _____ TELEPHONE NUMBER _____

CITY _____ STATE _____ ZIP CODE _____

Check is enclosed Purchase Order is enclosed

Enroll me in the:

WORKSHOP 7, January 23-27, 1967 WORKSHOP 8, February 6-10, 1967

SIGNATURE _____





These companies and agencies have been represented in past Workshops:

Alresearch Manufacturing Company
Arm Equipment Engineering Est.
Atlas-Chemical Industries
Automatic Electric Laboratories, Inc.
Baird Atomic, Inc.
Brown Engineering Company, Inc.
University of California —
 Radiation Laboratory
Canadian Ltd
Chrysler Corporation — Space Division
Dresser Electronics — S.I.E. Division
Duluth Avionics
Edgerton, Germeshausen & Grier, Inc.
Electro Development Corp
Electronic Modules
General Dynamics
General Electric —
 Space Technology Center
General Motors Corporation /
 Defense Research Labs
HRB Singer, Inc
International Business Machines
International Telephone & Telegraph
Lear Siegler, Inc.
Leeds & Northrup Co.,
 Research & Development
Litton Industries
Lockheed California Co
M & G Metals Products
Melpar Minuteman
Nortronics Precision Products
Picatinny Arsenal —
 Training & Dev. Branch
RCA — Astro-Electronics
Radiation, Inc.
Raltand Corporation
Savonic Instruments, Inc.
Sylvania
TRW Systems — Manufacturing Processes
Teledyne
U.S. Naval Ordnance Test Station —
 China Lake
United Control Corporation
Western Electric Co
Westinghouse, Inc.

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